(19) Europäisches Patentamt
European Patent Office
Offi e ur péen des brevets

(11) Publication number: **0 519 354 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **92109970.1**

(51) Int. Cl.5: **C07K 15/00, A61K 37/64**

(22) Date of filing: **13.06.92**

(30) Priority: **18.06.91 JP 245283/91**
19.12.91 JP 361135/91

(43) Date of publication of application:
23.12.92 Bulletin 92/52

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL PT SE

(71) Applicant: **FUJISAWA PHARMACEUTICAL CO., LTD.**
4-7, Doshomachi 3-chome Chuo-ku
Osaka-shi Osaka 541(JP)

(72) Inventor: **Inamura, Noriaki**
4-19-2, Kubogaoka, Moriya-machi
Kitasouma-gun, Ibaraki 302-01(JP)
Inventor: **Shingu, Yasuhiko**
2-25-5, Umezono
Tsukuba-shi, Ibaraki 305(JP)
Inventor: **Nakahara, Kunio**
7-29, Onokawa
Tsukuba-shi, Ibaraki 305(JP)
Inventor: **Notsu, Yoshitada**
3-4-1, Ottominami
Tsuchiura-shi, Ibaraki 300(JP)
Inventor: **Okamoto, Masanori**
3-22-6, Namiki
Tsukuba-shi, Ibaraki 305(JP)
Inventor: **Takase, Shigehiro**
1-12-10, Sousha
Ishioka-shi, Ibaraki 315(JP)
Inventor: **Hatanaka, Hiroshi**
3-12-21, Matsugaoka, Moriya-machi
Kitasouma-gun, Ibaraki 305(JP)
Inventor: **Ezaki, Masami**
17-1-304, Namiki 3-chome
Tsukuba-shi, Ibaraki 305(JP)
Inventor: **Tsujii, Eisaku**
4-5-77, Ninomiya
Tsukuba-shi, Ibaraki 305(JP)
Inventor: **Shigematsu, Nobuharu**
5-4-601, Umezono 2-chome
Tsukuba-shi, Ibaraki 305(JP)
Inventor: **Okuhara, Masakuni**
14-10, Umezono 2-chome
Tsukuba-shi, Ibaraki 305(JP)

(74) Representative: **Türk, Gille, Hrabal, Leifert**
Brucknerstrasse 20
W-4000 Düsseldorf 13(DE)

(54) **A prophylactic/therapeutic composition containing WS7622A for preventing or treating disseminated intravascular coagulation, chronic respiratory tract infectious disease or chronic bronchitis.**

(57) A prophylactic/therapeutic composition for disseminated intravascular coagulation, chronic respiratory tract infectious disease or chronic bronchitis which comprises WS7622A mono- or disulfate ester or their pharmaceutically acceptable salt. WS7622A is known from European patent application 91110243.2 (EP-A-0 465 895).

EP 0 519 354 A1

This invention relates to a prophylactic/therapeutic composition for disseminated intravascular coagulation, chronic respiratory tract infectious disease or chronic bronchitis comprising WS7622A mono- or disulfate ester or a pharmaceutically acceptable salt thereof as an active ingredient.

The some inventors of this invention previously invented a pharmaceutical composition comprising WS7622A mono- or disulfate ester having human leukocyte elastase inhibitory activity (European Patent Application No. 91110243.2). Now, the inventors of this invention have completed an invention directed to new medicinal uses for WS7622A mono- or disulfate ester or a pharmaceutically acceptable salt thereof which were not disclosed in the specification of the above application.

This invention relates to a prophylactic and therapeutic composition for disseminated intravascular coagulation (DIC), chronic respiratory tract infectious disease, or chronic bronchitis, which comprises WS7622A mono- or disulfate ester or a pharmaceutically acceptable salt thereof as an active ingredient.

WS7622A mono- and disulfate esters and pharmaceutically acceptable salts thereof, which are employed in this invention, are novel compounds and can be produced by converting WS7622A or a salt thereof (European publication No. 0387712 A1), which is known, to the corresponding sulfuric acid esters. Of these compounds, WS7622A disulfate ester disodium salt and WS7622A disulfate ester dipotassium salt have the following physicochemical properties.

WS7622A disulfate ester disodium salt
(disodium salt of WS7622A disulfate) :

Appearance : Colorless crystals

Solubility : Soluble;
water, methanol
Insoluble;
chloroform, n-hexane

Melting point : 257-263 °C (decompn.)

Specific rotation : $[\alpha]_D^{23}$ + 37.5° (C = 1.0, methanol)

Molecular formula : $C_{47}H_{61}N_9O_{19}S_2Na_2$

Elemental analysis :

Calcd.: (for $C_{47}H_{61}N_9O_{19}S_2Na_2 \cdot 6H_2O$)					
Found	C 44.30, C 44.98,	H 5.77, H 5.90,	N 9.89, N 10.06,	S 5.03, S 5.00,	Na 3.61% Na 3.98%

Molecular weight : FAB-MS m/z 1188 $(M + Na)^+$

Thin-layer chromatography :

Stationary phase	Developing solvent	Rf value
Silica gel (Merck Art 5715)	$CHCl_3$-CH_3OH-H_2O (65:25:4)	0.11
	n-Butanol-acetic acid-water (4:2:1)	0.29

Infrared absorption spectrum (attached Fig. 1) :

ν_{max}^{KBr}

3360, 2960, 1735, 1660, 1640, 1530, 1500, 1380, 1250, 1200, 1060, 1030, 940, 890 cm^{-1}

^1H Nuclear magnetic resonance spectrum (attached Fig. 2) :

(400 MHz, D_2O)δ	
7.50	(1H, s)
7.27	(1H, s)
7.33-7.24	(3H, m)
6.94	(1H, q, J = 7Hz)
6.85	(2H, br d, J = 8Hz)
5.53	(1H, m)
5.37	(1H, m)
4.80	(1H, br s)
4.63-4.57	(2H, m)
4.53	(1H, m)
4.06	(1H, m)
3.99	(1H, d, J = 10Hz)
3.56	(1H, br d, J = 14Hz)
3.46	(1H, m)
2.97	(3H, s)
2.97-2.88	(2H, m)
2.72	(1H, m)
2.59	(1H, m)
2.51-2.38	(2H, m)
2.09-1.91	(4H, m)
1.82-1.60	(3H, m)
1.77	(3H, d, J = 7Hz)
1.50	(3H, d, J = 6.5Hz)
1.40	(1H, m)
1.11	(6H, d, J = 7Hz)
0.99	(3H, d, J = 6.5Hz)
0.97	(3H, d, J = 6.5Hz)

^{13}C Nuclear magnetic resonance spectrum (attached Fig. 3) :

(100 MHz, D_2O) δ	
183.6	(s)
177.9	(s)
177.7	(s)
174.8	(s)
173.8	(s)
173.3	(s)
172.4	(s)
167.8	(s)
161.5	(s)
145.5	(s)
144.9	(s)
139.6	(d)
139.0	(s)
137.0	(s)
136.0	(s)
132.3	(d) x 2
131.0	(d) x 2
129.6	(d)
127.4	(d)
125.9	(d)
77.4	(d)
75.1	(d)
63.8	(d)
62.7	(d)
59.1	(d)
55.9	(d)
54.9	(d)
51.9	(d)
41.9	(t)
37.2	(d)
36.9	(t)
34.1	(q)
32.3	(d)

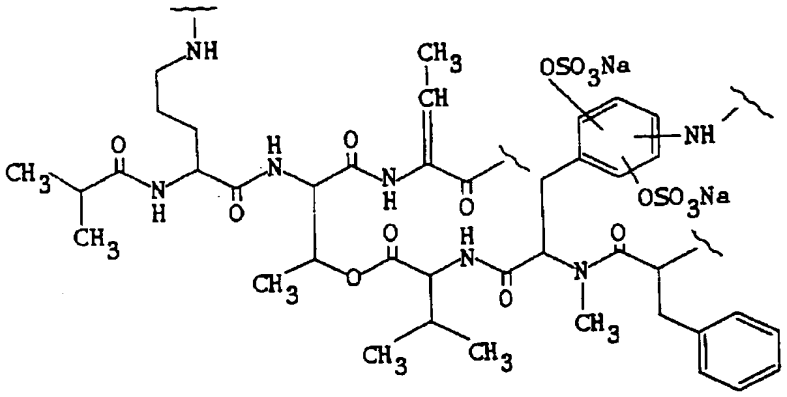
	31.9	(t)
	31.8	(t)
	31.2	(t)
	27.5	(t)
	23.7	(t)
	21.7	(q)
	21.4	(q) x 2
	21.3	(q)
	21.1	(q)
	15.5	(q)

Amino acid analysis :

WS7622A disulfate ester disodium salt (1 mg) was hydrolyzed with 6 N-hydrochloric acid (1 ml) at 110 °C for 20 hours and the hydrolyzate was concentrated to dryness and analyzed with a Hitachi 835 automatic amino acid analyzer. As the amino acid reference standards, Wako Pure Chemical's Type H (Wako Code 013-08391) and Type B (016-08641) were used.

As a result, threonine, valine, phenylalanine, ornithine, ammonia and several unknown ninhydrin-positive substances were detected.

The following partial structural formula is proposed for WS7622A disulfate ester disodium salt.



WS7622A disulfate ester dipotassium salt
(dipotassium salt of WS7622A disulfate) :

Appearance	: Colorless amorphous powder
Solubility	: Soluble; water, methanol Insoluble; chloroform, n-hexane
Melting point	: 230-237 °C (decompn.)
Specific rotation	: $[\alpha]_D^{23}$ + 34° (C = 1.0, methanol)
Molecular formula	: $C_{47}H_{61}N_9O_{19}S_2K_2$
Elemental analysis	:

Calcd.: (for $C_{47}H_{61}N_9O_{19}S_2K_2 \cdot 6H_2O$)					
Found	C 43.21, C 43.96,	H 5.63, H 5.44,	N 9.65, N 9.97,	S 4.91, S 5.09,	K 5.99% K 4.49%

Molecular weight : FAB-MS m/z 1236 $(M+K)^+$
Thin-layer chromatography :

Stationary phase	Developing solvent	Rf value
Silica gel (Merck Art 5715)	$CHCl_3$-CH_3OH-H_2O (65:25:4)	0.13

Infrared absorption spectrum (attached Fig. 4) :

ν_{max}^{KBr}

3360, 2960, 1735, 1660, 1640, 1530, 1500, 1405, 1380, 1250, 1200, 1050, 1030, 940, 890 cm^{-1}

^1H Nuclear magnetic resonance spectrum (attached Fig. 5) :

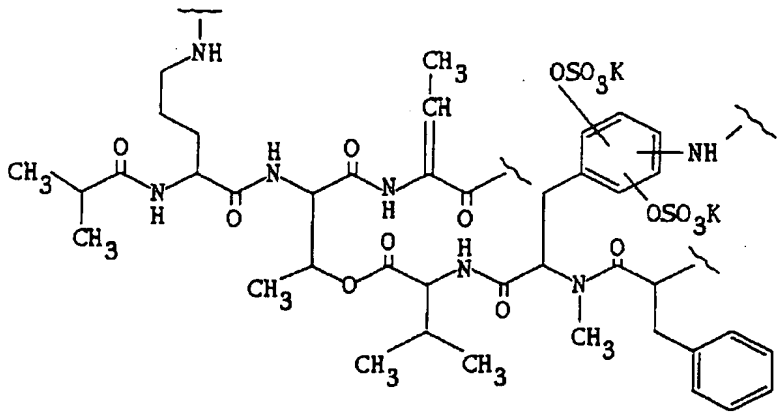
(400 MHz, D_2O) δ	
7.52	(1H, s)
7.28	(1H, s)
7.34-7.25	(3H, m)
6.96	(1H, g, J=7Hz)
6.87	(2H, br d, J=8Hz)
5.56	(1H, m)
5.40	(1H, m)
4.84	(1H, br s)
4.70-4.55	(3H, m)
4.10	(1H, m)
4.03	(1H, m)
3.60	(1H, br d, J=14Hz)
3.50	(1H, m)
3.00	(3H, s)
3.00-2.85	(2H, m)
2.76	(1H, m)
2.62	(1H, m)
2.55-2.40	(2H, m)
2.12-1.95	(4H, m)
1.90-1.65	(3H, m)
1.79	(3H, d, J=7Hz)
1.53	(3H, d, J=6.5Hz)
1.45	(1H, m)
1.14	(6H, d J=7Hz)
1.02	(3H, d J=6.5Hz)
1.00	(3H, d J=6.5Hz)

Amino acid analysis :

WS7622A disulfate ester dipotassium salt (1 mg) was hydrolyzed with 6 N-hydrochloric acid (1 ml) at 110°C for 20 hours and the hydrolyzate was concentrated to dryness and analyzed with a Hitachi 835 automatic amino acid analyzer. As the amino acid reference standards, Wako Pure Chemical's Type H (Wako Code 013-08391) and Type B (016-08641) were used.

As a result, threonine, valine, phenylalanine, ornithine, ammonia and several unknown ninhydrin-positive substances were detected.

The following partial structural formula is proposed for WS7622A disulfate ester dipotassium salt.



The pharmaceutically acceptable salt of WS7622A mono- or disulfate ester includes mono- or disalts with inorganic or organic bases such as alkali metal salts (e.g. sodium salt, potassium salt, etc.), alkaline earth metal salts (e.g. calcium salt etc.), ammonium salt, ethanolamine salt, triethylamine salt, dicyclohexylamine salt, pyridine salt and so on.

WS7622A mono- and disulfate esters and pharmaceutically acceptable salts thereof are of use as prophylactic-therapeutic agents for disseminated intravascular coagulation (DIC), chronic respiratory tract infectious disease and chronic bronchitis, and further are expected to be of use as prophylactic/therapeutic agents for arthrosclerosis, periodontitis, pulmonary fibrosis, chronic obstructive pulmonary disease, diffuse panbronchiolitis, hydroa, shock, systemic lupus erythematosus (SLE), Crohn's disease, amniorrhexis (premature labor), ischemic reperfusion disorder, systic fibrosis, bronchiectasia, and/or corneal cicatrization or fibroblast growth [ocular coagulation (burn, mechanical and chemical damages, keratoconjunctivitis) etc.].

As evidence of the usefulness of WS7622A mono- or disulfate ester or a pharmaceutically acceptable salt thereof, pharmacological test data on these compounds are presented below.

Test 1 Protease inhibition assay

(1) Method

The buffer solution used throughout this assay was 0.5 M NaCl-containing 0.1 M HEPES [N-(2-hydroxyethyl)piperazine-N'-(2-ethanesulfonic acid)], pH 7.5. Using a 96-well microtiter plate, 25 μl of 2mM methoxysuccinyl $(Ala)_2$-Pro-Val-p-nitroanilide (a 100mM solution in dimethyl sulfoxide was diluted with the buffer solution) was mixed with 50 μl of the sample (10 μl of an organic solvent solution of the sample was diluted 5-fold with the buffer solution).

The absorbance of the mixture at a wavelength of 415 nm was measured with a microplate reader (Corona Electric, Ibaragi Prefecture). Then, 6 μg/ml of human sputum elastase (HSE) was added and the mixture was allowed to stand at room temperature for 30 minutes. The absorbance at 415 nm was then measured. The percent inhibition (%) by the drug was calculated from the formula: 100 x (1 - r in the presence of an inhibitor/r in the absence of the inhibitor), wherein r represents the absorbance after 30 minutes' incubation minus the absorbance before addition of the enzyme.

The inhibitor activities against other proteases were assayed using N-succinyl-$(Ala)_3$-p-nitroanilide for swine pancreatic elastase (type IV, final concentration 5 μg/ml), N-alpha-benzoyl-Arg-p-nitroanilide for bovine pancreatic trypsin (type I, final conc. 16 μg/ml) and methoxysuccinyl-$(Ala)_2$-Pro-Met-p-nitroanilide for bovine pancreatic chymotrypsin (type II, final conc. 1.5 μg/ml). HSE was obtained from Elastin Products Co., Inc., Missouri, U.S.A. All other substrates and proteases were purchased from Sigma Chemicals Company.

Inhibitory activity of WS7622A disulfate ester disodium salt and WS7622A disulfate ester dipotassium salt against several kinds of serine proteases

(2) Results

Substance (M)	IC_{50} (M) Human sputum elastase	Swine pancreatic elastase	Trypsin (bovine)	Chymotrypsin (bovine)
WS7622A disulfate ester disodium salt	3.5×10^{-8}	4.9×10^{-8}	1.8×10^{-4}	2.0×10^{-7}
WS7622A disulfate dipotassium salt	5.9×10^{-8}	4.9×10^{-8}	2.0×10^{-4}	2.0×10^{-7}

Each inhibitory activity was expressed in 50% inhibitory concentration (IC_{50}).

Test 2 Effects on the endotoxin-induced disseminated intravascular coagulation (DIC) model

(1) Method

The rat model of DIC was constructed by the method of Nishikawa et al. (Life Science 39, 111, 1986).

First, under pentobarbital anesthesia (50 mg/kg, i.p.), the right femoral vein of 7-week-old male Wistar rats was canulated with a PE-50 tube for infusion of endotoxin (LPS) and the drug. The normal group was infused with saline, while the control group was infused with 0.25 mg/kg/hr of endotoxin over a period of 4 hours. The drug treatment group was infused with a mixture of endotoxin and the drug, with the amount of the drug being set at 10 mg/kg/hr. All infusions were performed at the rate of 2.3 ml/hr.

(2) Results

Treatment	n	PLT count ($\times10^3/mm^3$)	PT (sec)	APTT (sec)	Fig (mg/dl)	FDP (μg/ml)
Normal group	7	595±9.3	13.4±0.1	22.2±0.2	215±5.8	0.5±0.0
Control group	10	273±17.3	20.8±1.6	66.0±9.3	39±4.9	6.0±0.7
WS7622A disulfate ester disodium salt	7	318±16.0 (14.1%)	19.1±1.0 (23.4%)	52.8±8.3 (30.0%)	54±8.7 (8.2%)	5.0±0.0 (18.2%)

The figure in parentheses denotes % inhibition.

PLT : platelet
PT : prothrombin time
APTT : activated partial thromboplastin time
Fig : fibrinogen
FDP : fibrin and fibrinogen degradation products

Test 3 Determination of the activity in elastase-induced pulmonary damage.

(1) Method

Hamsters under pentobarbital anesthesia were used. Saline or saline-containing human sputum elastase was instilled intratracheally via a small incision in the ventral neck region using 1 ml syringe with a 27-gauge needle. After 3 hours, animals were sacrificed by CO_2 asphyxiation, each animal's trachea was reexposed. The lungs were then laveged using a 2.5-ml aliquot of saline and then withdrawing the saline, yielding a final volume of approximately 1.5 ml bronchoalveolar lavage (BAC) fluid from each animal.

The cells of BAL fluid were collected by centrifugation and were then diluted with distilled water to disrupt, and the hemoglobin contents determined spectrophotometrically at 541 nm.

Test drugs were dissolved in salin and instilled intratracheally in the same manner as used to instill elastase, at 5 minutes before instillation of elastase.

(2) Results

Inhibitory effect on elastase-induced lung hemorrhage			
Test compound	5 min predose (μg/site)	Hemorrhage (OD 541 nm)	% inhibition
Normal	-	0.31±0.12	-
Control	-	29.35±2.9	-
WS7622A disulfate ester disodium salt	1	19.06±1.40*	35.4
	10	9.75±4.82*	67.5
	100	0.28±0.05***	100.1
WS7622A disulfate ester dipotassium salt	1	19.71±1.20*	33.2
	10	10.73±1.20**	64.1
	100	0.35±0.16***	99.9

*p< 0.05,
**P< 0.01,
***p< 0.001 compared with control group (Student t test)

The pharmaceutical composition of this invention can be used in the conventional dosage forms such as powder, fine granule, granule, tablet, sugar-coated pill, microcapsule, capsule, suppository, solution, suspension, emulsion, syrup, injection, inhalant and so on. Where necessary, there may be incorporated in the composition a diluent or disintegrator (e.g. sucrose, lactose, starch, crystalline cellulose, low-substitution hydroxypropylcellulose, synthetic aluminum silicate, etc.), a binder (e.g. cellulose, methylcellulose, hydroxypropylcellulose, hydroxymethylpropylcellulose, polypropylpyrrolidone, polyvinylpyrrolidone, gelatin, gum arabic, polyethylene glycol, etc.), a colorant, a sweetener, a lubricant (e.g. magnesium stearate etc.) and so on.

Though dependent on the patient's age, body weight and clinical condition, among other factors, the pharmaceutical composition of this invention can be administered in a daily dose of 100 mg to 10 g and preferably 1 g to 5 g, as the claimed compound or pharmaceutically acceptable salt, which daily dose may be administered in 1-3 divided doses. Typical unit doses are 50 mg, 100 mg, 200 mg, 500 mg and 1 g.

Claims

1. A prophylactic/therapeutic composition for disseminated intravascular coagulation, chronic respiratory tract infectious disease or chronic bronchitis which comprises WS7622A mono- or disulfate ester or their pharmaceutically acceptable salt, among which WS7622A disulfate ester disodium salt and WS7622A disulfate ester dipotassium salt have the following physico-chemical properties :

WS7622A disulfate ester disodium salt :

Appearance	: Colorless crystals
Solubility	: Soluble; water, methanol Insoluble; chloroform, n-hexane
Melting point	: 257-263° C (dec.)
Specific rotation	: $[\alpha]_D^{23}$ + 37.5° (C = 1.0, methanol)
Molecular formula	: $C_{47}H_{61}N_9O_{19}S_2Na_2$
Elemental analysis	:

Calcd.: (for $C_{47}H_{61}N_9O_{19}S_2Na_2 \cdot 6H_2O$)					
Found	C 44.30, C 44.98,	H 5.77, H 5.90,	N 9.89, N 10.06,	S 5.03, S 5.00,	Na 3.61% Na 3.98%

Molecular weight : FAB-MS m/z 1188 $(M + Na)^+$
Thin-layer chromatography :

Stationary phase	Developing solvent	Rf value
Silica gel (Merck Art 5715)	$CHCl_3$-CH_3OH-H_2O (65:25:4)	0.11
	n-Butanol-acetic acid-water (4:2:1)	0.29

Infrared absorption spectrum (attached Fig. 1) :

$$\nu_{max}^{KBr}$$

3360, 2960, 1735, 1660, 1640, 1530, 1500, 1380, 1250, 1200, 1060, 1030, 940, 890 cm^{-1} ^1H Nuclear magnetic resonance spectrum (attached Fig. 2) :

(400 MHz, D_2O)δ	
7.50	(1H, s)
7.27	(1H, s)
7.33-7.24	(3H, m)
6.94	(1H, q, J=7Hz)
6.85	(2H, br d, J=8Hz)
5.53	(1H, m)
5.37	(1H, m)
4.80	(1H, br s)
4.63-4.57	(2H, m)
4.53	(1H, m)
4.06	(1H, m)
3.99	(1H, d, J=10Hz)
3.56	(1H, br d, J=14Hz)
3.46	(1H, m)
2.97	(3H, s)
2.97-2.88	(2H, m)
2.72	(1H, m)
2.59	(1H, m)
2.51-2.38	(2H, m)
2.09-1.91	(4H, m)
1.82-1.60	(3H, m)
1.77	(3H, d, J=7Hz)
1.50	(3H, d, J=6.5Hz)
1.40	(1H, m)
1.11	(6H, d, J=7Hz)
0.99	(3H, d, J=6.5Hz)
0.97	(3H, d, J=6.5Hz)

^{13}C Nuclear magnetic resonance spectrum (attached Fig. 3) :

(100 MHz, D_2O)δ
183.6 (s)

177.9	(s)
177.7	(s)
174.8	(s)
173.8	(s)
173.3	(s)
172.4	(s)
167.8	(s)
161.5	(s)
145.5	(s)
144.9	(s)
139.6	(d)
139.0	(s)
137.0	(s)
136.0	(s)
132.3	(d) x 2
131.0	(d) x 2
129.6	(d)
127.4	(d)
125.9	(d)
77.4	(d)
75.1	(d)
63.8	(d)
62.7	(d)
59.1	(d)
55.9	(d)
54.9	(d)
51.9	(d)
41.9	(t)
37.2	(d)
36.9	(t)
34.1	(q)
32.3	(d)
31.9	(t)
31.8	(t)
31.2	(t)

27.5	(t)
23.7	(t)
21.7	(q)
21.4	(q) x 2
21.3	(q)
21.1	(q)
15.5	(q)

Amino acid analysis :

WS7622A disulfate ester disodium salt (1 mg) was hydrolyzed with 6 N-hydrochloric acid (1 ml) at 110 °C for 20 hours and the hydrolyzate was concentrated to dryness and analyzed with a Hitachi 835 automatic amino acid analyzer. As the amino acid reference standards, Wako Pure Chemical's Type H (Wako Code 013-08391) and Type B (016-08641) were used.

As a result, threonine, valine, phenylalanine, ornithine, ammonia and several unknown ninhydrin-positive substances were detected.

WS7622A disulfate ester dipotassium salt :

Appearance	: Colorless amorphous powder
Solubility	: Soluble; water, methanol Insoluble; chloroform, n-hexane
Melting point	: 230-237 °C (dec.)
Specific rotation	: $[\alpha]_D^{23}$ + 34° (C = 1.0, methanol)
Molecular formula	: $C_{47}H_{61}N_9O_{19}S_2K_2$
Elemental analysis	:

Calcd.: (for $C_{47}H_{61}N_9O_{19}S_2K_2 \cdot 6H_2O$)					
Found	C 43.21, C 43.96,	H 5.63, H 5.44,	N 9.65, N 9.97,	S 4.91, S 5.09,	K 5.99% K 4.49%

Molecular weight : FAB-MS m/z 1236 $(M + K)^+$

Thin-layer chromatography :

Stationary phase	Developing solvent	Rf value
Silica gel (Merck Art 5715)	$CHCl_3$-CH_3OH-H_2O (65:25:4)	0.13

Infrared absorption spectrum (attached Fig. 4) :

ν_{max}^{KBr}

3360, 2960, 1735, 1660, 1640, 1530, 1500, 1405, 1380, 1250, 1200, 1050, 1030, 940, 890 cm^{-1}

^1H Nuclear magnetic resonance spectrum (attached Fig. 5) :

(400 MHz, D_2O)δ	
7.52	(1H, s)
7.28	(1H, s)
7.34-7.25	(3H, m)
6.96	(1H, q, J = 7Hz)
6.87	(2H, br d, J = 8Hz)
5.56	(1H, m)
5.40	(1H, m)
4.84	(1H, br s)
4.70-4.55	(3H, m)
4.10	(1H, m)
4.03	(1H, m)
3.60	(1H, br d, J = 14Hz)
3.50	(1H, m)
3.00	(3H, s)
3.00-2.85	(2H, m)
2.76	(1H, m)
2.62	(1H, m)
2.55-2.40	(2H, m)
2.12-1.95	(4H, m)
1.90-1.65	(3H, m)
1.79	(3H, d, J = 7Hz)
1.53	(3H, d, J = 6.5Hz)
1.45	(1H, m)
1.14	(6H, d J = 7Hz)
1.02	(3H, d J = 6.5Hz)
1.00	(3H, d J = 6.5Hz)

Amino acid analysis :

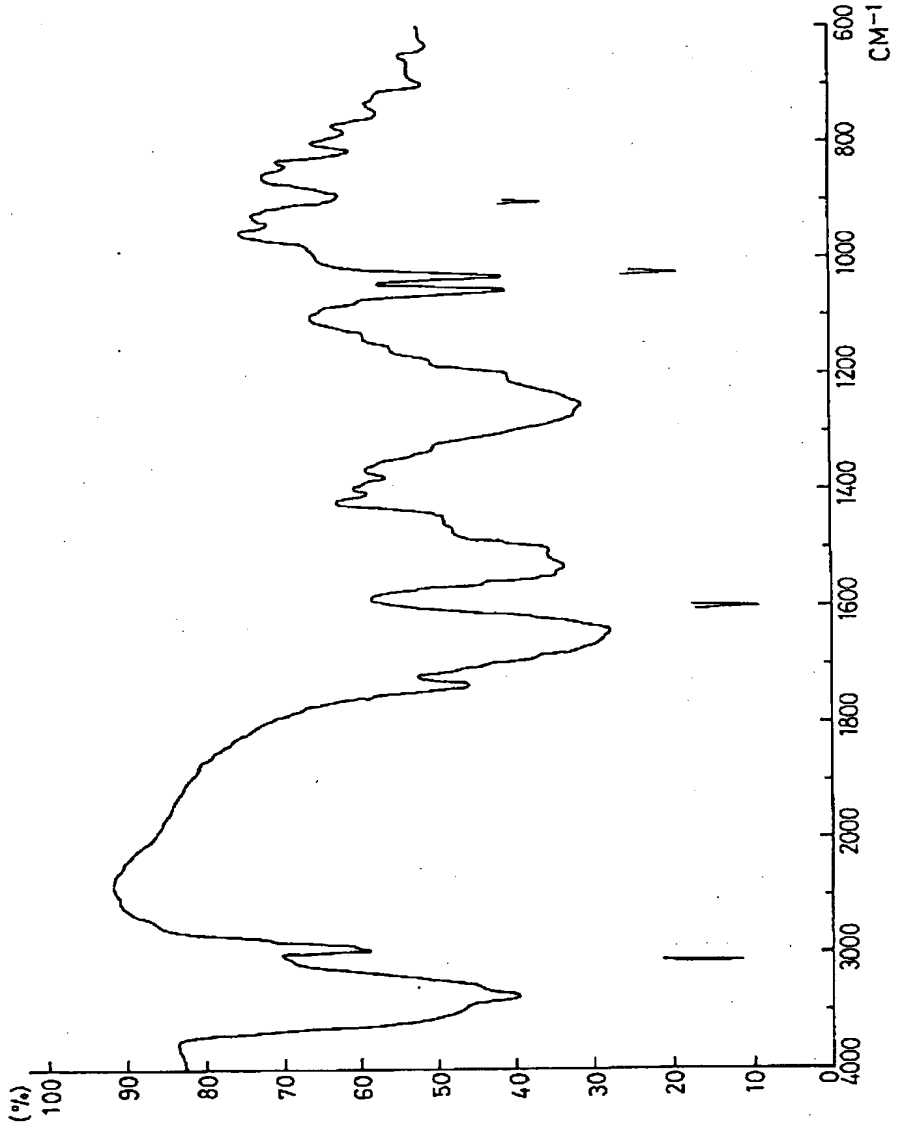
WS7622A disulfate ester dipotassium salt (1 mg) was hydrolyzed with 6 N-hydrochloric acid (1 ml) at 110 °C for 20 hours and the hydrolyzate was concentrated to dryness and analyzed with a Hitachi 835 automatic amino acid analyzer. As the amino acid reference standards, Wako Pure Chemical's Type H (Wako Code 013-08391) and Type B (016-08641) were used.

As a result, threonine, valine, phenylalanine, ornithine, ammonia and several unknown ninhydrin-positive substances were detected.

2. WS7622A mono- or disulfate ester or their pharmaceutically accetable salt, among which WS7622A disulfate ester disodium salt and WS7622A disulfate ester dipotassium salt have physico-chemical proporties as defined in claim 1, for use in prophylaxis/therapy of disseminated intravascular coagulation, chronic respiratory tract infectious disease or chronic bronchitis.

3. Use of WS7622A mono- or disulfate ester or their pharmaceutically acceptable salt, among which WS7622A disulfate ester disodium salt and WS7622A disulfate ester dipotassium salt have physico-chemical properties as defined in claim 1, for the preparation of a medicament for preventing or treating disseminated intravascular coagulation, chronic respiratory tract infectious disease or chronic bronchitis.

Fig. 1
Infrared absorption spectrum of
WS7622A disulfate ester disodium salt



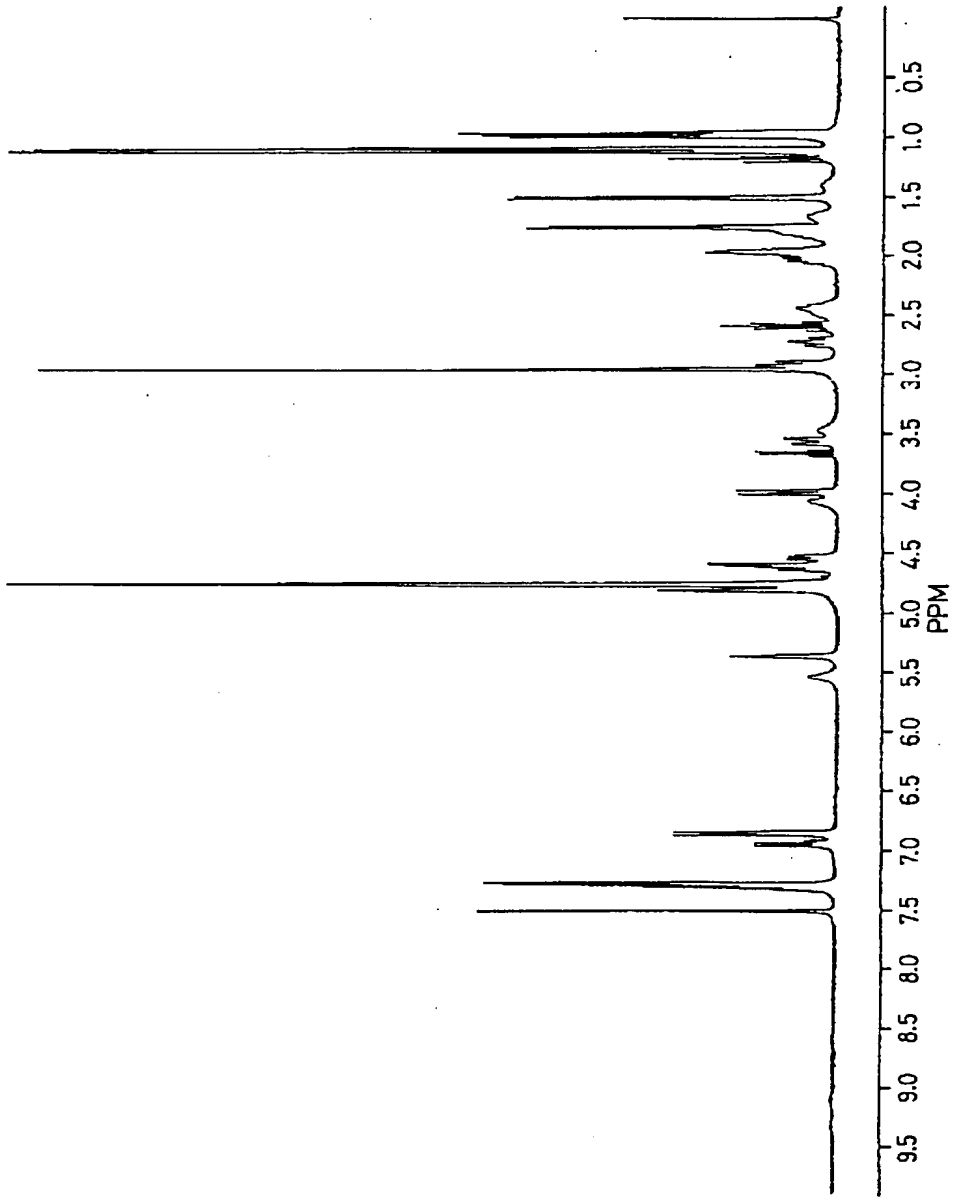


Fig. 2
^{1}H Nuclear magnetic resonance spectrum of WS7622A disulfate ester disodium salt

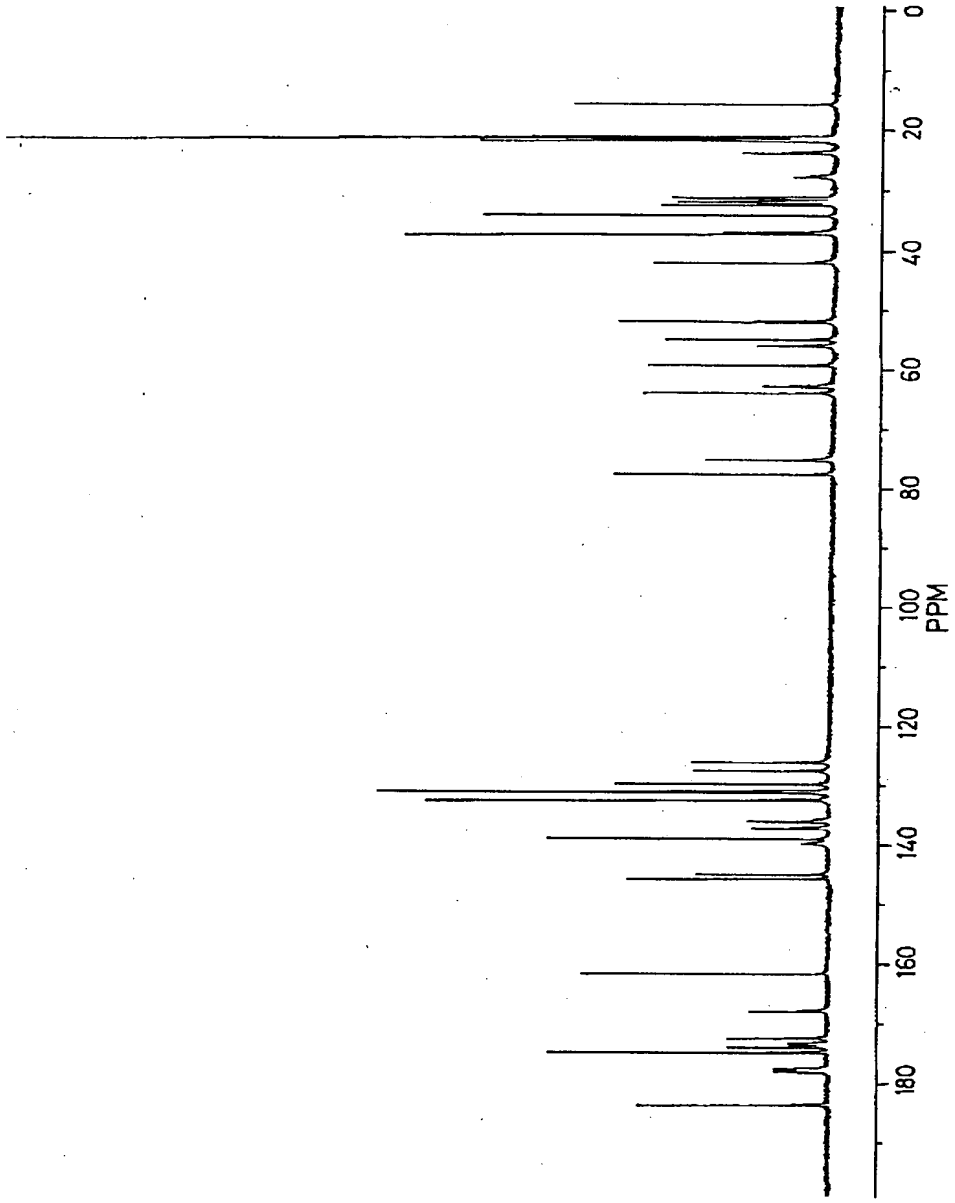
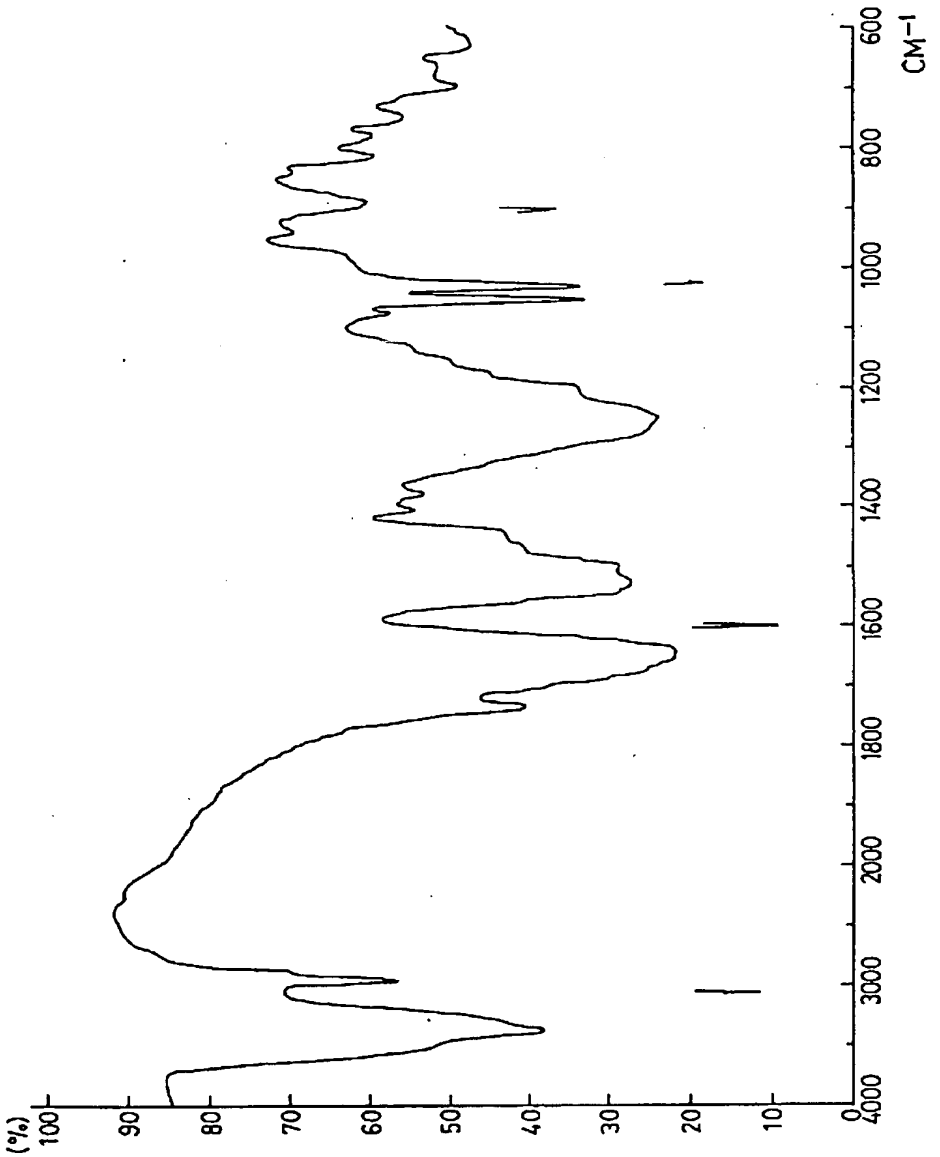


Fig. 3
^{13}C Nuclear magnetic resonance spectrum of WS7622A disulfate ester disodium salt

Fig. 4
Infrared absorption spectrum of
WS7622A disulfate ester dipotasium salt



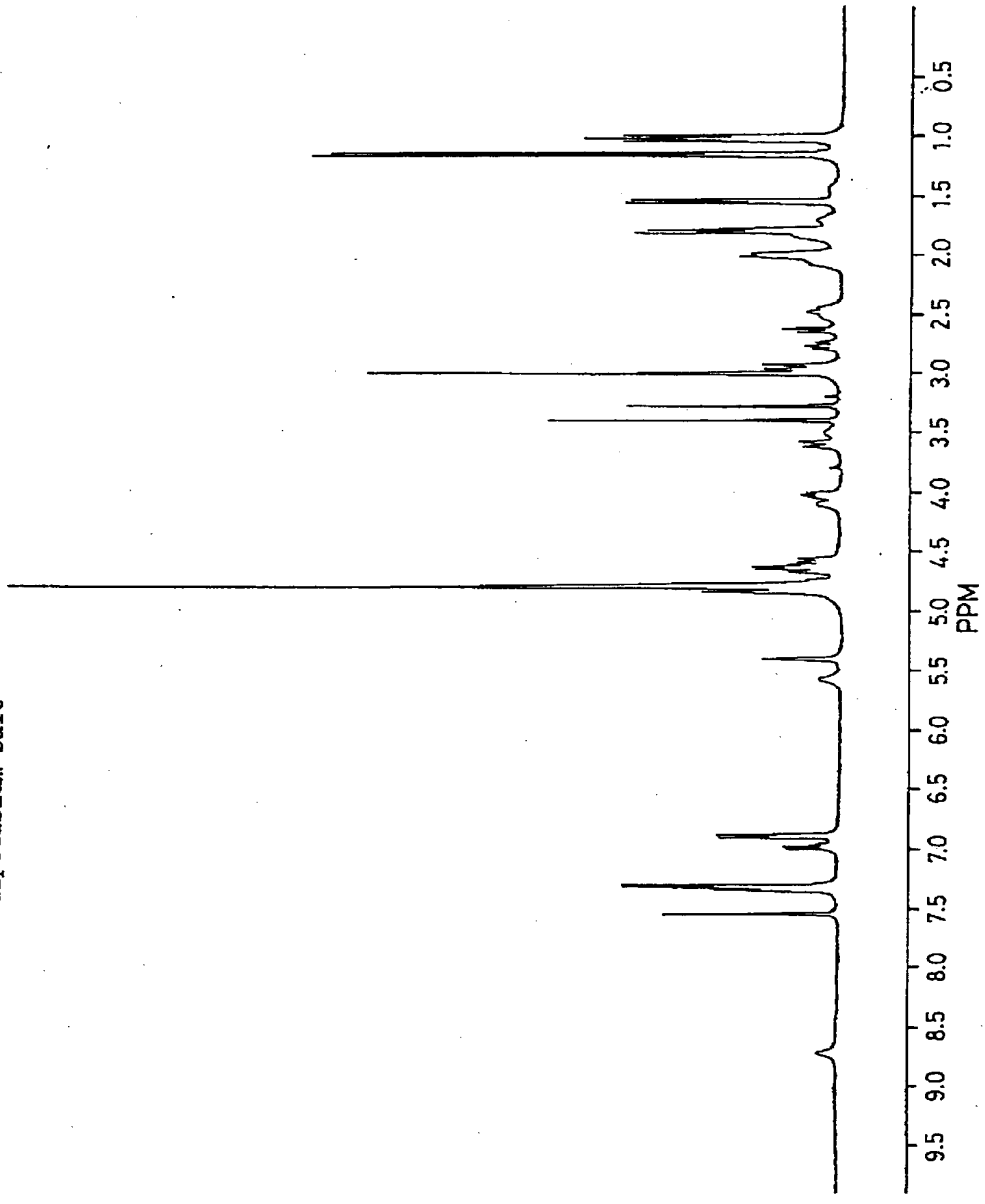


Fig. 5
^{1}H Nuclear magnetic resonance spectrum of WS7622A disulfate ester dipotasium salt

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 10 9970

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D, P	EP-A-0 465 895 (FUJISAWA PHARMACEUTICAL) * claims 9-15 *	1-3	C07K15/00 A61K37/64
A,D	EP-A-0 387 712 (FUJISAWA PHARMACEUTICAL) * claims 14-15 *	1-3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

C07K
A61K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	03 SEPTEMBER 1992	AVEDIKIAN P.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)